Bullet Wounds

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THE simple and common type of bullet wound shows an entrance and exit wound; but it is well known that a bullet often re-enters the body and a second pair of wounds results. Suppose, however, that the first exit wound and the second entrance wound are so close together that they form only one wound. The patient would then have three wounds and no lodged bullet. The second exit wound may, of course, be absent, leaving two wounds and a bullet lodged in a distant part of the body. I have known a case of this type where the bullet entered the deltoid region and left the body in the concavity of the neck above the clavicle, and re-entering immediately, lodged on the opposite side of the neck. The bullet in this case was discovered after twenty years, and an examination of the scars showed how the original error had been made.

Where a patient has a single wound, the bullet is often found under the skin. It would appear that the strong and elastic skin can hold up a bullet that has passed through and shattered a bone a few inches away.

The diagram (fig. 1) shows ten possible varieties of entrance and exit wounds where the bullet passed once or twice through the body. This diagram may appear somewhat complicated; but it is quite inadequate when we consider wounds of the intestine. The lumen of the bowel might be regarded as the exterior of the body, and an entrance wound on the anterior abdominal wall may be associated with an opening in the bowel lumen, and this wound could be described as an exit wound. If a wound is discovered in the bowel, a search will be made for a second wound, but it is obviously of great importance that a bullet may cause a single wound in the bowel. I do not refer to wounds of the bowel in this strictly correct sense, I regard the wound of the bowel as seen at operation from the peritoneal aspect, and while I admit that such a wound is an exit wound of the body, I prefer to call it an entrance wound of the bowel. The possible types of bowel injury caused by a bullet are described in fig. 2. In these five types of injury the peritoneum and muscle retract and the wound is larger in these layers than in the mucos membrane. A single coil of jejunum may show eight to twelve wounds. It must obviously be an even number, unless one of the injuries is the type A or B, shown in fig. 2, in which event there will be an odd number. The type C class of injury may be easily mistaken for a single wound unless a probe is passed into the lumen and the mucos membrane bridge demonstrated. When operating for small bullet or shrapnel wounds of the abdomen, I follow the track of the bullet through the abdomen and deal with the injuries in order from anterior to posterior as the missile passed through in a straight line. This has the advantage that there is no confusion and time is saved. I am aware that this departs somewhat from the advice that the arrest of bleeding and the closure of colonic wounds take first place, and I admit that these complications are urgent; but I think they should be approached in an orderly manner along the track of the bullet. I will describe four cases of this

type of injury with operative details. These are the only cases I have seen in the past ten years.

Case 1.—P. M. 10th May, 1935. Age 30. This man was shot in the abdomen by a .22 copper or bronze bullet, which passed through the left hand and entered the left side of the abdomen above the costal margin. The bullet had lodged below

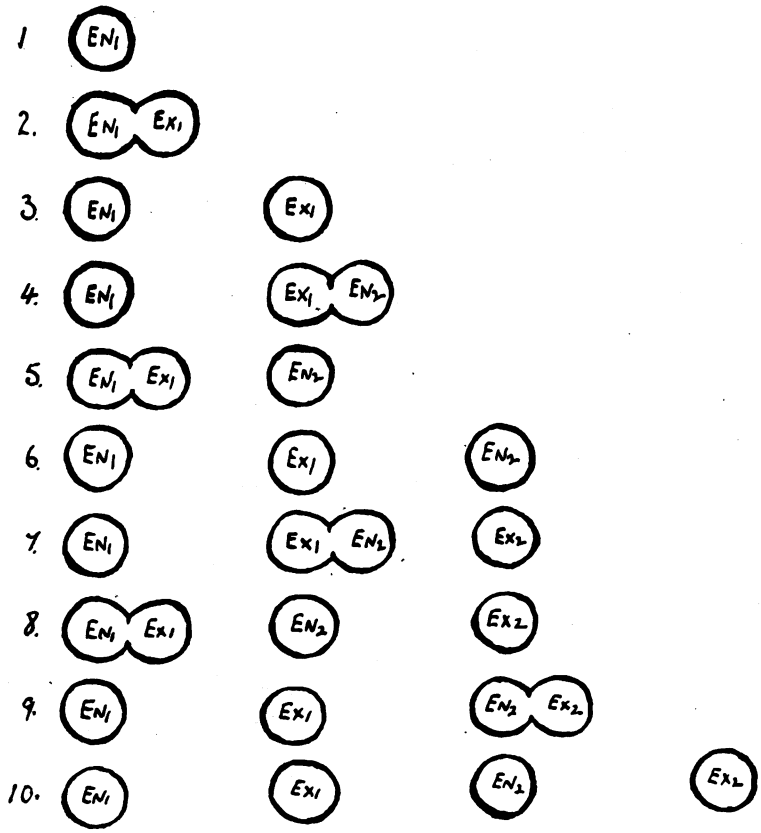

FIG. 1
Diagram showing types of entrance and exit wounds.
In 1, 3, 4, 5, and 6 there is a lodged bullet.
EN1 and EN2 are entrance wounds.
EX1 and EX2 are exit wounds.

the skin in the left renal area, about two inches above the iliac crest. The abdomen was opened four hours after the accident through a left paramedian incision, and a hole in the great omentum was demonstrated. It was now obvious that the stomach had escaped, and that the bullet had passed directly from the anterior abdominal wall to the omentum. This hole was repaired by a stitch, which picked up a small bleeding point. It was also obvious that the bullet had passed into the lesser sac, and when the omentum was turned up, a hole was found on the deep aspect, and quite close to this there were a pair of holes in the transverse colon.

The anatomical disposition of these holes was such that it was apparent that no structure in the lesser sac had been injured, and that the bullet had entered the left ilio-lumbar region of the peritoneal cavity, and that there were only two holes in the transverse colon, and finally, that the bullet was travelling slightly to the left. The colon was repaired and the jejunum was examined from above downwards, and six holes were found in one of the upper coils. These were repaired,

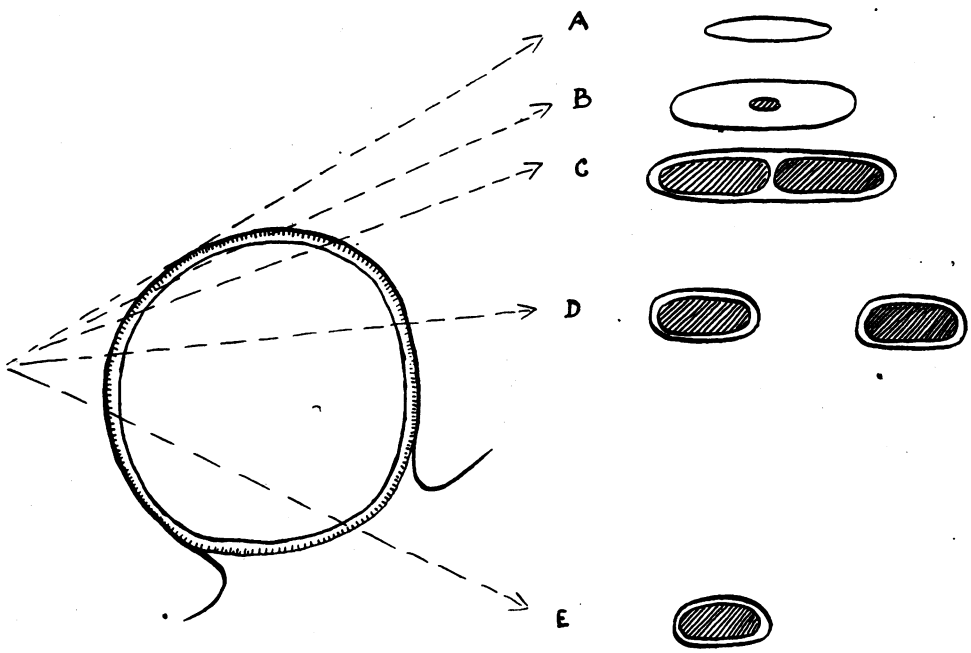

FIG. 2

Five types of bowel injury are illustrated by the arrows showing the track of the bullet in relation to the bowel. On the left is shown the types of wounds seen on examining the bowel at operation.

A.—Shows mucous membrane intact with the outer coats shaved.
B.—Shows a single wound of the mucous membrane.
C.—Shows a pair of wounds separated by a small bridge of mucous membrane.
D.—Shows a distinct pair of wounds.
E.—Shows a single wound, the second wound being extraperitoneal.

NOTE.—The wounds A, B, C, or D may occur in extraperitoneal areas.

and it was considered advisable to examine the entire small intestine, no other injury being discovered. It was now certain that there was an injury of the posterior wall of the left ilio-lumbar region, and that the left kidney, and more particularly the descending colon, must be examined for injury. In order to carry out this investigation, it was necessary to extend the original incision transversly to the left. This disclosed a tear of the peritoneum below the lower pole of the left kidney and to the medial side of the descending colon. This was repaired with a few catgut sutures. The abdomen was closed, the patient turned on his face, and the bullet excised through a small incision.

Case 2.—Private R. McC. 3rd September, 1939. Age 19. This soldier has some claim to fame, as he was shot at 3.30 p.m., war having started at 11 a.m. on the same day. The bullet was lead and slightly smaller than a .45. It entered the abdomen above and to the right of the umbilicus. The exit wound was in the right renal area, about half way between the last rib and the iliac crest. The abdomen was opened by a right paramedian incision, and a wound was found in the peritoneum above the transverse colon and at the outer edge of the duodenum. The peritoneum is thick at this point, and I do not think it would be correct to describe it as a part of the great omentum; but it was very close to the right edge of this omentum. This wound was enlarged, and two wounds were demonstrated in the extra-peritoneal part of the transverse colon. These were repaired, and the duodenum was now mobilised and brought forward, and a single small wound was found. The bullet now passed through the kidney, and this was left undisturbed. This man drained urine from the exit wound for two weeks and had some hæmaturia.

Case 3.—T. B. 20th September, 1940. Age 20. This man was shot from behind, and the exit and entrance wounds were almost identically the reverse of Case 2. The bullet was lead, .45 size. A small piece of omentum was protruding through the exit wound. When the abdomen was opened, an omental wound was found just below the right half of the transverse colon. When the omentum was turned up, a single entrance wound was found in the transverse colon. Small intestine was injured, as the bullet took a short course through the right iliolumbar region of the peritoneal cavity. The exit wound in the colon was extraperitoneal, and it was demonstrated by mobilising the bowel from above, and at the same time a single wound was found in the duodenum. The psoas muscle was extensively torn, but the kidney escaped injury. On passing a probe into the wound in the psoas muscle the operating table was touched. A sterile towel should be placed underneath these patients, so that the aseptic technique will not be interfered with.

Case 4.—Naval Rating S. April, 1941. Age 20. This man was struck in the abdomen by a small piece of a large bomb. There was a small entrance wound slightly to the right midway between the umbilicus and the symphysis pubis. A portable X-ray showed a shadow of an opaque body about one inch below the right iliac crest. The omentum was injured near the right lower border. The lower ilium had four wounds which were repaired. The ascending colon showed an entrance wound just above the iliocæcal valve. The cæcum and ascending colon were mobilised and turned medially to find the colon exit wound. This was small and valvular and difficult to find in the loose tissue of this region. After a somewhat prolonged search I noticed a few air bubbles in this tissue at one point, and closer examination revealed the extra-peritoneal opening.

I am glad to say that these four consecutive cases recovered. Operation was carried out within six hours of the injury. Morphia was given in large doses before operation for pain. No resection of bowel was necessary and no severe

bleeding was encountered. No blood transfusions or chemotherapy was used. Antitetanic serum was given. Drains were inserted down to colonic wounds.

An attempt was made in each case to visualise the track of the bullet and to examine carefully every important structure in relation to the track, and to deal with the injuries in order from anterior to posterior. Before operation, an attempt was made to forecast the structures injured by an examination of the exit and entrance wounds, and where the exit wound was absent, an X-ray examination was made. This is a very useful and instructive anatomical exercise; it is surprising how correct such a forecast may be, and the mistakes are instructive. At operation an attempt was made to distinguish the exit and entrance wounds of the bowel in order that the important and hidden extra-peritoneal wounds would not be missed. I understand that in the last war, when Paris was being shelled every twenty minutes by a long-distance concealed gun, that a shell passed through a building, leaving an entrance and exit gap in two parallel walls. Engineers were able to reconstruct the track of the shell from these two defects, and the exact compass bearing of the gun was discovered. Inside the abdomen a pair of wounds in the bowel help the surgeon by guiding him in the line of the track towards other injured structures.

I publish the details of exit and entrance wounds of the bowel because I find almost no information on this subject in text-books. I have not seen a description of a pair of wounds in the bowel separated by a mucos membrane bridge, and I think the two cases I describe with a single wound in the duodenum are of interest.

I have also described a plan of campaign for this type of injury, which is briefly following the track of the bullet. The first step is to find the hole in the omentum, and when this is turned up the peritoneal space which is affected is demonstrated. The contents of this space are investigated, and the track followed out of the peritoneal space to the exit wound.

I have to thank my friend, Mr. P. P. Wright, for permission to publish the details of Case 3.